RESEARCH ARTICLE

Retrospective Analysis of Clinical Attributes Related to Uterine Torsion in Goats

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Abstract

The retrospective analysis of clinical attributes and incidence of uterine torsion was worked out from the last ten year's records, from 2012-21, maintained at the Veterinary Clinical Complex of the institute in Gujarat (India). The overall incidence of uterine torsion was 14.17 %, with a higher occurrence in pluriparous (63.89%) compared to primiparous goats (36.11%). The majority of goats suffered from post-cervical torsion (77.78%) than that of pre-cervical torsion (22.22%), whereas the degree of torsion, <180 and >180 vis-a-vis direction of uterine rotation either to the right or left, distributed equally. Goats carried single kid (97.22%) had significantly (P<0.01) higher incidences of uterine torsion than those carried twins (2.78%). From the present study, it is concluded that uterine torsion prevailed in 14.17 % of goats to cause dystocia and was abundant post-cervical in location with higher incidence associated with singleton pregnancies.

Key words: Goat, Retrospective, Uterine torsion.

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Introduction

The goat is a poor man's cow and is domesticated worldwide for milk and meat production and to provide fibers, cashmere, and leather (Alford, 2008). It is considered among the most popular and beneficial livestock for those with limited resources (Devendra, 2005). In India, there are 18 recognized breeds of goats, and its population (148.88 million) is also showing an increase of 10.10% over the previous census. Out of it, 48.6 lakh goats are distributed throughout Gujarat. Reproductive performance is a significant determinant of the productivity and economic viability of goat farming. The goat is the most fertile species, with a conception rate near 90 % (Peaker, 1978). The gestational period varied from 142 days to 150 days, but several problems were observed during this period and at the time of kidding. Dystocia is the most common obstetrical problem that leads to the death of the fetus and the dam, and may be either fetal or maternal, contributing 40.17 % and 59.82 %, respectively (Purohit, 2006).

Out of all obstetrical problems, uterine torsion signifies the rotation of the pregnant uterus on its longitudinal axis, with twisting of the anterior vagina (Noakes *et al.,* 2001). The overall incidence of uterine torsion in goats is 1.8 to 2.0 %. Uterine torsion is uncommon in goats as compared to buffalo and cattle. The low incidence of uterine torsion in goats is due to bicornuate pregnancy and sublumbar attachment of mesometrium (Gupta *et al.,* 2020). The twisting of the pregnant uterus leads to the death of the fetus in-utero, besides the future fertility of the affected dam. Ultimately delay in the correction of uterine torsion causes the dam's death due to the development of generalized bacteraemia, endotoxaemia, and cardio-vascular failure (Schonfelder *et al.,* 2005). Looking towards the above facts, the present study was planned to know the incidence of various clinical attributes related to uterine torsion in goats.

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Materials and Methods

The goats brought for the treatment of various obstetrical problems were included in the present study. The overall incidence of uterine torsion in goats was worked out from the retrospective analysis of ten years of records from 2012 to 2021, maintained at the Veterinary Clinical Complex, Deesa, and Department of Veterinary Gynaecology and Obstetrics, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Sardarkrushinagar. The incidence of uterine torsion was studied overall and also with reference to the parity of the dam, duration of torsion,

site, side, and degree of torsion, and the number of kids. For detailed analysis, these attributes were further divided into primiparous and pluriparous, < 24 h and > 24 h, pre-and post-cervical, right-and left-side torsion, degree < 180 or > 180, and single and twin kids. Generated data were analyzed using the chi-square test in SPSS software (v. 20.0) to know significant variation, if any, in different variables.

Results and Discussion

Overall Incidence of Uterine Torsion

The overall incidence of uterine torsion in goats for ten years from 2012 to 2021 was found to be 14.17 % (36/254). The highest incidence of uterine torsion was recorded in 2021 (24.44%; 11/45), and the lowest in 2013 (0.00%; 0/22, Table 1). The present finding is in close agreement with Patel (2019), who reported a 12.99 % incidence of uterine torsion in goats. Similarly, Sharma *et al.* (2014) and Bhattacharya *et al*. (2015) reported 10.53 % and 15.38 % incidence of uterine torsion among the maternal causes of dystocia. A comparatively lower incidence of uterine torsion, from 8.0 to 9.66 %, was reported in goats and sheep (Wehrend *et al.,* 2002; Sudha, 2019). On the contrary to present findings, the lowest incidence of uterine torsion, from 1.4 to 5.0%, has been recorded by several workers (Gupta *et al.,* 2020; Gupta *et al.,* 2021). The low incidence of uterine torsion in goats is due to difficulty in palpation of the cervix per-rectally and vaginal folds per-vaginally besides mesometrium attached at the sub-lumber region (Wehrend *et al.,* 2002).

Among several predisposing factors of uterine torsion in goats, an unequal number of fetuses in the uterine horn (Roberts, 1986) and greater athleticism (Biswal *et al.,* 2015) are encountered promptly. Strong fetal movements during labour have been hypothesized to increase the risk of uterine torsion. Varied incidence of uterine torsion could be due to the breed variation, geographical location, prolificacy, sex of the fetus, and management practices (Frazer *et al.,* 1996; Naik, 2016). Besides this, the higher incidence of uterine torsion in the present study might be due to the use of trans-abdominal ultrasonography to diagnose uterine torsion in goats. Lack of exercise and sudden falling or slipping of advanced pregnant goats might significantly contribute to the higher incidence of uterine torsion (Jayaganthan *et al.,* 2020; Balasopoulou *et al.,* 2022).

Parity of the Dam

Out of 36 uterine torsion cases, the incidence of uterine torsion was non-significantly higher in pluriparous (23/36; 63.89%) as compared to primiparous does (13/36; 36.11%, Table 2). This result was in close agreement with the findings of Sudha (2019). Bhattacharya *et al.* (2015) and Patel (2019) also opined that pluriparous goats are more prone to dystocia than primiparous. Irrespective of breeds, many researchers however reported higher incidence of uterine torsion in pluriparous (51.30 to 88.41 %) compared to primiparous (11.59 to 48.70 %) animals (Naik, 2016; Thangamani *et al.,* 2019). Pluriparous goats suffered more with uterine torsion in the present study might be due to the instability of the gravid uterus inside a capacious and pendulous abdomen, in addition to carrying an odd number of fetuses, decreased uterine tone and a stretched mesometrium (Roberts, 1986; Biswal *et al.,* 2015).

Duration of Uterine Torsion

Table 2 shows the incidence of uterine torsion in relation to the duration of torsion in uterine torsion-affected goats presented during ten years' period. Most cases of uterine torsion affected goats (58.33%) were reported for treatment after > 24 h from the onset of dystocia, whereas 41.67 % were reported for treatment < 24 h before. The differences in the duration of torsion were non-significant. In consistency with the present result, Sudha (2019) reported that 80 % of cases in goats suffered > 24 h of the course of uterine torsion. Similarly, Chauhan (2018) observed a significantly higher number of cases of > 72 h compared to upto 24 h of the duration of torsion in Mehsana buffaloes.

In contrary to the present findings, numerous clinical case reports of uterine torsion in goats were presented within 12 to 24 h to the referral hospital (Phogat *et al.,* 2007; Yadav *et al.,* 2018; Chauhan *et al.,* 2020; Jakkali *et al.,* 2022). Goats that need obstetrical assistance need to be referred to a hospital within 2 h as delayed presentation leads to pathological changes in the uterus and cervix besides the death of the fetus due to fetal hypoxia and the separation of fetal membranes (Brounts *et al.,* 2004). The slightly higher duration of uterine torsion cases in goats presented at the hospital might be due to the goat owner's expectation for normal kidding, unaware of the uterine torsion in goats, and the lack of skilled practitioners in the field.

Table 1: Overall incidence of uterine torsion in goats during the year 2012-2021 (n=254)

Year	Total no. of dystocia cases	Total no. of uterine torsion cases	Incidence (%)
2012	12	1	8.33
2013	22	0	0.00
2014	20	3	15.00
2015	22	3	13.64
2016	39	4	10.26
2017	21	3	14.29
2018	23	4	17.39
2019	26	2	7.69
2020	24	5	20.83
2021	45	11	24.44
Total	254	36	**14.17**

Table 2: Incidence of different clinical attributes of uterine torsion in goats (n=36)

Sr. No.	Clinical attributes	Subgroups	No. of cases (n=36)	Incidence (%)	Significance
1	Parity of the dam	Primiparous	13	36.11	x^2 df_1 = 2.78 P= 0.095, NS
		Pluriparous	23	63.89	
2	Duration of torsion	< 24 h	15	41.67	x^2 df_1= 1.00 P= 0.317, NS
		> 24 h	21	58.33	
3	Side of torsion	Right-sided	18	50.00	x^2 df_1= 0.00 P= 1.000, NS
		Left-sided	18	50.00	
4	Site of torsion	Pre-cervical	8	22.22	x^2 df_1= 11.11 P= 0.001, S
		Post-cervical	28	77.78*	
5	Degree of torsion	<180 degree	18	50.00	x^2 df_1=0.00 P= 1.000, NS
		>180 degree	18	50.00	
6	Number of kids	Single kid	35	97.22*	x^2 df_1= 32.11 P= 0.001, S
		Twin kid	1	2.78	

Side of Uterine Torsion

In the present study in goats, the proportion of right-sided and left-sided uterine torsion was reported to be 50-50% . The current findings are in close agreement with the observation of Bhattacharya *et al.* (2015). Sudha (2019) observed the right-sided and left-sided uterine torsion ratio in goats as 60:40 %. However, a 100 % left-sided uterine torsion in goats was reported by Balasubramanian *et al.* (2013). Numerous case reports have recorded the right-sided (Chauhan *et al.,* 2018; Yadav *et al.,* 2018; Chauhan *et al.,* 2020) and left-sided (Sharma *et al.,* 2014; Biswal *et al.,* 2015; Jakkali *et al.,* 2022) uterine torsion in small ruminants. However, a higher incidence of left-sided uterine torsion was accounted for sheep (Balasopoulou *et al.,* 2022). In buffaloes, right-sided uterine torsion was comparatively more common (Chauhan, 2018; Thangamani *et al*., 2019) possibly due to the presence of a rumen at the left side, which prevents rotation of the uterus to the left side, and the absence of a muscular fold on the right broad ligament. However, the equal proportion of right and left-sided uterine torsion in the present study might be due to the attachment of broad ligaments at the sub-lumber region centrally, which gives stability to the uterus inside the abdomen for its rotation in goats as compared to a sub-ilial region in buffaloes (Frazer *et al.,* 1996).

Site of Uterine Torsion

In the present study, the post-cervical uterine torsion was recorded to be 77.78% (28/36), whereas pre-cervical uterine torsion was reported only in 22.22 % (8/36) cases. The post-cervical torsion was significantly (P<0.01) higher than pre-cervical uterine torsion (Table 2). This result is closely corroborated with the findings of Sudha (2019) in goats, and also of Thangamani *et al.* (2019) in buffaloes. However, Balasubramanian *et al.* (2013) also documented 100% post-cervical uterine torsion in goats, while an equal proportion of pre- and post-cervical uterine torsion has been reported in goats and sheep by Bhattacharya *et al.* (2015) and Balasopoulou *et al.* (2022). Numerous reports presented the post-cervical uterine torsion in sheep and goats (Biswal *et al.,* 2015; Chauhan *et al.,* 2018; Chauhan *et al.,* 2020; Jayaganthan *et al.,* 2020; Jakkali *et al.,* 2022), whereas only a few records are available on the pre-cervical location of uterine twist (Phogat *et al.,* 2007; Ansari, 2014). The higher incidence of post-cervical uterine torsion in goats might be due to palpating vaginal folds through per-vaginal examination (Noakes *et al.,* 2001). Pre-cervical torsions are frequently misinterpreted for insufficient cervical dilatation on vaginal examination because they are not often accompanied by palpable vaginal spiral folds (Scott, 2011). The limitations of per-rectal examination make it very difficult to distinguish pre-cervical torsion in goats (Phogat *et al.,* 2007). Sometimes, pre-cervical torsion may be undetected, even during a caesarean section (Youngquist and Threlfall, 2007).

Degree of Torsion

The degree of uterine torsion reflexes is an approximate estimation of the rotation that gives an idea about the severity of the case. In the present study, an equal proportion (50-50%) of <180 degrees and > 180 degrees uterine torsion was recorded. This result was nearly similar to the finding of Sudha (2019), who reported >180 degree torsion in 60 % cases. Balasubramanian *et al.* (2013) observed 3 cases of ≥180 degrees (75 %) and 1 case of < 180 degree (25%) uterine torsion in goats. Gupta *et al.* (2021) reported that 180 and 90 degrees were significantly higher than 270 and 360 degrees of torsion in small ruminants. Balasopoulou *et al.* (2022) observed the variable degree of torsion in sheep, with 1.7 % cases of 90°, 30 % of 180°, 6.7 % of 270°, 30 % of 360°, 10 % of 540° and 6.7 % of 720°. Some case reports of uterine torsion in small ruminants noted >90° (Biswal *et al.,* 2015), 180°

(Chauhan *et al.,* 2018; Jakkali *et al.,* 2022), 180-270° (Phogat *et al.,* 2007; Yadav *et al.,* 2018) and near to 360° (Chauhan *et al.,* 2020) of torsion.

The equal proportion of >180 and <180 degrees of uterine torsion (50:50%) noted in current study might be attributed to sub-lumber attachment of broad ligaments that may have a role in preventing a more degree of uterine rotation in goats beside the uterine instability and other predisposing factors acknowledged as a source of torsions up to 180° (Frazer *et al.,* 1996). The variation in the degree of uterine torsion might be due to the dam's hormonal status, the fetal movement, or some other unknown factors (Bhatol, 2007).

Number of Kids Delivered

The incidence of the number of kids delivered in uterine torsion affected goats is presented in Table 2. Out of the total 36 uterine torsions-affected goats, the maximum cases had single kid (97.22%; 35/36), whereas only 2.78 % (1/36) cases had twins. The difference was highly significant (P<0.01). The present findings are consistent with Gupta *et al.* (2020) in goats, and Balasopoulou *et al.* (2022) in sheep, where 88.89 % and 63.30 % of the single, and 7.41 % and 33.30 % of twin fetuses were delivered from torsion affected animals, respectively. Triplets also accounted for 3.3 to 13.05 % (Sudha, 2019; Gupta *et al.,* 2020; Balasopoulou *et al.,* 2022) in small ruminants, which was also slightly higher than the percentages reported for twin kids (2.78 %) in the present study. Moreover, Balasubramanian *et al.* (2013) and Sudha (2019) observed a higher incidence of twin kid delivery from uterine torsion-affected goats (39.13 to 75.00 %). Numerous clinical case reports have documented the delivery of twin fetuses (Sharma *et al.,* 2014; Biswal *et al.,* 2015) from uterine torsion affected sheep and goats. An unequal number of kids in each horn is a risk factor for uterine torsion in goats (Balasubramanian *et al.,* 2013; Biswal *et al.,* 2015). Roberts (1986) reported that the higher frequency of singleton or mono-cornual pregnancy in small ruminants increases the risk of twisting the uterus, which agrees with the present findings.

Conclusion

From the study, it is concluded that among the dystotic does, the uterine torsion accounts for around 14 %, with its post-cervical location in majority of cases. It was further higher (97.22 %) in does carried single kid.

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